

Importation of *Salvia officinalis* L. (Sage) as Leaves and Stems From El Salvador, Honduras, and Nicaragua into the Continental United States

A Qualitative, Pathway-Initiated Risk Assessment

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A. Introduction

This risk assessment (RA) was prepared for the Animal and Plant Health Inspection Service (APHIS), U.S. Department of Agriculture (USDA) under Purchase Order Number 43–6395–0–2185 (dated June 27, 2000). The project was supported by the U.S. Agency for International Development under Project Hurricane Mitch Economic Initiative.

The purpose of this RA is to examine pest risks associated with the importation into the United States of *Salvia officinalis* (sage) as leaves and stems from El Salvador, Honduras, and Nicaragua. The RA is a qualitative one in which risk is expressed in terms such as high and low rather than in numerical terms such as probabilities or frequencies. The details of the methodology and rating criteria can be found in *Pathway-Initiated Pest Risk Assessments: Guidelines for Qualitative Assessments, Version 5.0* (USDA, 2000a).

Regional and international plant protection organizations—e.g., the North American Plant Protection Organization (NAPPO) and the International Plant Protection Convention (IPPC) administered by the Food and Agriculture Organization (FAO) of the United Nations—provide guidance for conducting RA. The methods used to initiate, conduct, and report this RA are consistent with guidelines provided by NAPPO and FAO. Our use of biological and phytosanitary terms conforms to “Definitions and Abbreviations” (Introduction Section) of *International Standards for Phytosanitary Measures, Section 1—Import Regulations: Guidelines for Pest Risk Analysis* (FAO, 1996).

The FAO guidelines describe three stages of pest risk analysis: Stage 1 (initiation), Stage 2 (risk assessment), and Stage 3 (risk management). This document satisfies the requirements of FAO Stages 1 and 2.

B. Risk Assessment

1. Initiating Event: Proposed Action

This RA is commodity based and therefore “pathway initiated.” It was conducted in response to a request for the USDA to authorize the importation of a particular commodity presenting a potential plant pest risk. The importation into the United States of fresh sage leaves as a commodity from El Salvador, Honduras, and Nicaragua is a potential pathway for the introduction of plant pests. The regulatory authority for the importation of fruits and vegetables from foreign sources into the United States may be found in the Code of Federal Regulations (7CFR§319.56).

2. Assessment of Weediness Potential of *Salvia officinalis*

The results of weediness screening for *Salvia officinalis* from El Salvador, Honduras, and Nicaragua (Table 1) did not prompt a pest-initiated risk assessment.

Table 1. Process for Determining Weediness Potential of the Commodity
<p>Commodity: Fresh leaves and stems of <i>Salvia officinalis</i> L. (Lamiaceae), (sage) for consumption.</p> <p>Phase 1: <i>Salvia officinalis</i> is commonly grown in gardens throughout the United States. Seed is available at garden centers and from seed suppliers. The species is represented in at least 16 states in a plant distribution data base (USDA, 2000b).</p> <p>Phase 2: Is the species listed in:</p> <p><u>NO</u> <i>Geographical Atlas of World Weeds</i> (Holm, et al., 1979). <i>S. officinalis</i> is not listed as a weed. (In 5 countries, up to 28 <i>Salvia</i> species are listed as either common weeds or present as a weed but of unknown importance, or as part of the flora. None are listed as principal or serious weeds.</p> <p><u>NO</u> <i>World's Worst Weeds</i> (Holm, et al., 1977).</p> <p><u>NO</u> <i>Report of the Technical Committee to Evaluate Noxious Weeds: Exotic Weeds for Federal Noxious Weed Act</i> (Gunn and Ritchie, 1982).</p> <p><u>NO</u> <i>Economically Important Foreign Weeds</i> (Reed, 1977). <i>S. officinalis</i> is not listed but five species of <i>Salvia</i> are so listed.</p> <p><u>NO</u> <i>Composite List of Weeds</i> (Weed Science Society of America, 1989). <i>S. officinalis</i> is not listed but five species of <i>Salvia</i> are so listed.</p> <p><u>NO</u> <i>World Weeds</i> (Holm, et al., 1997).</p> <p><u>NO</u> Is there any literature reference indicating weediness (e.g., <i>AGRICOLA</i>, <i>CAB</i>, <i>Biological Abstracts</i>, and <i>AGRIS</i> search on "species name" combined with "weed").</p> <p>Phase 3: Conclusion: <i>Salvia officinalis</i> is widely grown in the United States. Seeds and plants are readily available. The weediness potential of the imported commodity is negligible.</p>

3. Previous Risk Assessments and Decision History for *Salvia officinalis* (sage), and Port-of-entry Pest Interceptions from El Salvador, Honduras, and Nicaragua

Previous history (APHIS, 2000a): No decision sheets for the three countries.

Note: In 1988, Guatemala: "Disapproved: Exotic rust disease caused by the fungus, *Puccinia* spp. for which there is no acceptable treatment."

Pest Interceptions (APHIS, 2000b): No interception records from the three countries of concern for this commodity.

4. Pest Categorization

Pests reported in the scientific and regulatory literature on *Salvia* spp. from the three countries are recorded in Table 2. The term “*Salvia*” was selected for access to the computerized scientific literature services because a preliminary survey revealed few references when the term “*Salvia officinalis*” was used. Table 2 also presents information about geographic distribution, host associations and regulatory data. Table 2 represents a “master list” of these organisms and serves as a basis for selecting pests for more detailed biological analysis.

Table 2. Pests Associated with <i>Salvia</i> spp. in El Salvador, Honduras, and Nicaragua					
Pest Name (Order: Family)	Geographic Distribution ¹	Plant Part Affected ²	Quarantine Pest ³	Likely to Follow Pathway ³	References
ARTHROPODS					
<i>Bemisia tabaci</i> (Gennadius) (Homoptera: Aleyrodidae)	ES, HO, NI US	L	N	Y	CABI, 2000; Maes and Mound, 1993; McGuire and Crandall, 1967; Passoa, 1983
<i>Coccus hesperidum</i> Linnaeus (Homoptera: Coccidae)	ES, HO, NI, US	L, S	N	Y	CABI, 2000; IIE, 1972; McGuire and Crandall, 1967
<i>Ferrisia virgata</i> (Cockerell) (Homoptera: Pseudococcidae)	HO, NI, US	L, S, F	N	Y	Ben-Dov, 1994; CABI, 2000; IIE, 1966
<i>Macrosiphum salviae</i> (Barth) (Homoptera: Aphididae)	HO, NI, US	L	N	Y	Blackman and Eastop, 2000; Ferrandiz-Puga, <i>et al.</i> , 1985; Smith and Cermeli, 1979; Touhey, 2000
<i>Neurocolpus mexicanus</i> Distant (Heteroptera: Miridae)	ES, HO, NI	L	N	Y	Maes and Carvalho, 1989
<i>Octotoma scabripennis</i> Guerin (Coleoptera: Chrysomelidae)	ES, HO, NI, US (Hawaii)	L	Y	Y	Arnett, 1985; CABI, 2000; Maes and Staines, 1991
<i>Peridroma saucia</i> (Hübner) (Lepidoptera: Noctuidae)	ES, HO, NI, US	L, S, Fw, W	N	Y	Caballero <i>et al.</i> , 1994; CABI, 2000; McGuire and Crandall, 1967

Table 2. Pests Associated with *Salvia* spp. in El Salvador, Honduras, and Nicaragua

Pest Name (Order: Family)	Geographic Distribution ¹	Plant Part Affected ²	Quarantine Pest ³	Likely to Follow Pathway ³	References
<i>Pseudococcus jackbeardsleyi</i> Gimpel and Miller (Homoptera: Pseudococcidae)	ES, HO, NI, US	L, S, F	N	Y	CABI, 2000
<i>Trichoplusia ni</i> (Hübner) (Lepidoptera: Noctuidae)	ES, HO, NI, US	L, S	N	Y	Caballero <i>et al.</i> , 1994; CABI, 2000; McGuire and Crandall, 1967
FUNGI					
<i>Puccinia caulicola</i> Tracy & B. T. Galloway (Basidiomycetes: Uredinales)	HO, US	L	N	Y	Appendix to this report; ARS, 2000
<i>Puccinia farinacea</i> Long (Basidiomycetes: Uredinales)	HO, US	L	N	Y	Appendix to this report; ARS, 1960; ARS, 2000
<i>Puccinia farinacea</i> Long var. <i>constricta</i> Baxter (Basidiomycetes: Uredinales)	HO	L	Y	Y	Baxter and Cummins, 1951
<i>Puccinia gentilis</i> Arth. (Basidiomycetes: Uredinales)	HO	L	Y	Y	Baxter and Cummins, 1951
<i>Puccinia impedita</i> Mains & Holw., Arth. (Basidiomycetes: Uredinales)	ES, HO, US (Puerto Rico, Virgin Islands)	L	Y	Y	ARS, 1960; ARS 2000; Baxter and Cummins, 1951
<i>Puccinia infrequens</i> Holw. (Basidiomycetes: Uredinales)	HO	L	Y	Y	Baxter and Cummins, 1951

Table 2. Pests Associated with *Salvia* spp. in El Salvador, Honduras, and Nicaragua

Pest Name (Order: Family)	Geographic Distribution ¹	Plant Part Affected ²	Quarantine Pest ³	Likely to Follow Pathway ³	References
<i>Puccinia mitrata</i> Syd var. <i>basiporula</i> Baxter (Basidiomycetes: Uredinales)	HO	L	Y	Y	Baxter and Cummins, 1951
<i>Puccinia salvicola</i> Dietel & Howl. (Basidiomycetes: Uredinales)	HO, US	L	N	Y	Appendix to this report; ARS, 2000
<i>Thielaviopsis</i> <i>basicola</i> (Berk. & Broome) Ferrais (Deuteromycotina: Hyphomycetes)	ES, US	L, S	N	Y	ARS, 2000; CABI, 2000
NEMATODES					
<i>Pratylenchus</i> <i>penetrans</i> (Cobb) Filipjev & Schuurmans (Pratylenchidae)	ES, US	R	N	N	Anon, 1984; CABI, 2000

¹ ES = El Salvador, HO = Honduras, NI = Nicaragua, US = United States

² L = Leaves, S = Stems, W = Whole plant, F = Fruit, Fw = Flowers, R = Roots

³ Y = Yes , N = No

Any pest species listed in the above pest list that has a “Y” in the “Quarantine Pest” column, is considered to be a quarantine pest of sage from any of the three countries. Should any of these pests be intercepted on commercial (or any other) shipments stems and leaves of *Salvia officinalis* quarantine action will be taken. An “N” is used to denote pests that are not of quarantine significance.

Only those quarantine pests that can reasonably be expected to follow the pathway with commercial shipments of leaves and stems of *Salvia officinalis*, were analyzed in detail. Only quarantine pests that have a “Y” in the “Likely to Follow Pathway” column and a “Y” in the “Quarantine Pest” column were selected for further analysis in Tables 3, 4 and 5 (USDA, 2000a).

5. Consequences of Introduction (Table 3)

The five quarantine pests from Table 2 are considered for further analysis according to the five risk elements (REs) described in the Guidelines (USDA, 2000a).

Table 3. Risk Rating for Consequences of Introduction						
Pest Species	RE #1 Climate/Host Interaction	RE #2 Host Range	RE #3 Dispersal Potential	RE #4 Economic Impact	RE #5 Environ- mental Impact	Cumulative Risk Rating
<i>Octotoma scabripennis</i>	Medium 2	High 3	Medium 2	Medium 2	Medium 2	Medium 11
<i>Puccinia farinacea</i> var. <i>constricta</i>	High 3	Low 1	High 3	Medium 2	Medium 2	Medium 11
<i>Puccinia gentilis</i>	High 3	Low 1	High 3	Medium 2	Medium 2	Medium 11
<i>Puccinia infrequens</i>	High 3	Low 1	High 3	Medium 2	Medium 2	Medium 11
<i>Puccinia mitrata</i> var. <i>basiporula</i>	High 3	Low 1	High 3	Medium 2	Medium 2	Medium 11

6. Likelihood of Introduction (Table 4)

The ratings for risk subelements (SEs) of Risk Element #6 concerning “likelihood for introduction” of the pest are shown in Table 4.

Table 4. Risk Rating for Likelihood of Introduction (Risk Element 6)							
Pest Species	SE #1 Quantity imported annually	SE #2 Survive postharvest treatment	SE #3 Survive shipment	SE #4 Not detected at port of entry	SE #5 Moved to a suitable habitat	SE #6 Contact with host material	Cumulative Risk Rating
<i>Octotoma scabripennis</i>	Medium 2	High 3	High 3	Medium 2	Medium 2	Medium 2	Medium 14
<i>Puccinia farinacea</i> var. <i>constricta</i>	Medium 2	High 3	High 3	Medium 2	High 3	Medium 2	Medium 15
<i>Puccinia gentilis</i>	Medium 2	High 3	High 3	Medium 2	High 3	Medium 2	Medium 15
<i>Puccinia infrequens</i>	Medium 2	High 3	High 3	Medium 2	High 3	Medium 2	Medium 15
<i>Puccinia mitrata</i> var. <i>basiporula</i>	Medium 2	High 3	High 3	Medium 2	High 3	Medium 2	Medium 15

7. Conclusion: Pest Risk Potential and Suggested Phytosanitary Measures

The pest risk potential ratings for the pests listed in Tables 3 and 4 is shown in Table 5.

Table 5. Pest Risk Potential			
PEST	Consequences of Introduction (Cumulative Risk Rating)	Likelihood of Introduction (Cumulative Risk Rating)	Pest Risk Potential ¹
<i>Octotoma scabripennis</i>	Medium 11	Medium 14	Medium 25
<i>Puccinia farinacea</i> Long var. <i>constricta</i> Baxter	Medium 11	Medium 15	Medium 26
<i>Puccinia gentilis</i>	Medium 11	Medium 15	Medium 26
<i>Puccinia infrequens</i>	Medium 11	Medium 15	Medium 26
<i>Puccinia mitrata</i> var. <i>basiporula</i>	Medium 11	Medium 15	Medium 26

¹ Pest Risk Potential (USDA, 2000a).

Pest Risk potential ratings have the following suggested meanings (USDA, 2000a):

“Low: Pest will typically not require specific mitigation procedures. The port-of-entry inspection to which all imported commodities are subjected can be expected to provide sufficient phytosanitary security.

Medium: Specific phytosanitary measures may be necessary.

High: Specific phytosanitary measures are strongly recommended. Port-of-entry inspection is not considered sufficient to provide phytosanitary security.”

The ratings and risk potential score for the above mentioned *Puccinia* species were based on the very limited published data and the biologic characteristics of *Puccinia* (Agrios, 1997).

As stated in the Guidelines (USDA, 2000a), a detailed examination and choice of appropriate sanitary and phytosanitary measures to mitigate pests risk for pests with particular risk potential scores or ratings is undertaken as part of the pest risk management phase and is not discussed in this document. The appropriate risk management strategy for a particular pest depends on the risk posed by that pest.

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